



## Assessing the classification of work-relatedness of fatal incidents: a comparison between Australia, New Zealand and the United States

Tim Driscoll , Anne-Marie Feyer , Nancy Stout & Ann Williamson

To cite this article: Tim Driscoll , Anne-Marie Feyer , Nancy Stout & Ann Williamson (2002) Assessing the classification of work-relatedness of fatal incidents: a comparison between Australia, New Zealand and the United States, *Injury Control and Safety Promotion*, 9:1, 32-39, DOI: [10.1076/icsp.9.1.32.3321](https://doi.org/10.1076/icsp.9.1.32.3321)

To link to this article: <https://doi.org/10.1076/icsp.9.1.32.3321>



Published online: 09 Aug 2010.



Submit your article to this journal [↗](#)



Article views: 30



View related articles [↗](#)



Citing articles: 3 View citing articles [↗](#)

---

ORIGINAL PAPER

# Assessing the classification of work-relatedness of fatal incidents: a comparison between Australia, New Zealand and the United States

---

Tim Driscoll<sup>1</sup>, Anne-Marie Feyer<sup>2</sup>, Nancy Stout<sup>3</sup> and Ann Williamson<sup>4</sup>

<sup>1</sup>Centre for Occupational and Environmental Health, University of Sydney, Australia, <sup>2</sup>New Zealand Environmental and Occupational Health Research Centre, University of Otago, New Zealand, <sup>3</sup>National Institute of Occupational Safety and Health, Bethesda, MD, USA, and <sup>4</sup>New South Wales Injury Risk Management Research Centre, University of New South Wales, Australia.

---

## Abstract

As part of a larger study comparing work-related fatal injury of workers in Australia, New Zealand and the United States, an assessment was made of the similarities and differences between the three countries in identifying fatal incidents as work-related or not. The researchers in each country independently classified 333 brief scenarios, describing a variety of fatal incidents, into one of nine categories related to work: worker, bystander, commuter, volunteer, student, suicide, other, unknown and none of the above. Complete agreement with the classification was moderate (62%), but agreement when classifying scenarios as working, not working or unknown was much higher (full agreement for 80% of scenarios; Kappa = 0.71). Only 5% of scenarios were classified differently by all three countries. Other main findings of the study were that there is variation between countries in the interpretation of what is and what is not work-related, and variation in the amount or type of information required to make a definitive classification. Common circumstances described in the scenarios for which there was some disagreement in classification included domestic violence incidents at work, volunteer workers, business trips, social functions connected to work, hobby farmers and some possible bystander incidents that occurred on farms or on the road. The results suggest that, even without the use of standard definitions, comparisons between the datasets of the countries involved in this study can be made with reasonable confidence. However, they also emphasise the importance of

minimising ambiguity in the definitions used, and of understanding the manner in which the definitions are applied, when comparing results between studies.

**Keywords:** Work-related injury; accident classification; fatal accidents; occupational safety.

## Introduction

When studying work-related injury or disease, it is important to consider the definitions to be used. The definition of 'working' and 'work-related' can seem synonymous and straightforward. However, there are many different arrangements in which people derive benefit from activities, and many situations that expose them or others to associated health and safety hazards. Work-related injuries and illnesses can occur away from a formal workplace, and some incidents that occur at a workplace may not be considered to be related to work. This variety of arrangements and situations that can be seen as encompassing work or as being related to work can lead to different interpretations and definitions of 'working' and 'work-relatedness'. In addition, there can be subtle differences in the way the same definitions are applied. Examples of situations that may lead to different interpretations include persons receiving non-monetary 'compensation' for jobs; children 'working' in a family-owned business

---

Accepted 12 December, 2001.

*Correspondence:* Dr. Tim Driscoll, COEH, c/- 49 Taleeban Rd., Riverview, NSW 2066, Australia. Tel./fax: +61-2-98030301, E-mail: elmatom@optushome.com.au

such as a corner store or farm; fringe ‘jobs’ such as collecting discarded cans to sell; social functions sponsored by an employer; volunteers; ‘bystanders’; and people performing ‘domestic’ duties. (The definitions of ‘injury’ and ‘disease’ can also differ,<sup>1</sup> but these are not the main focus of this paper.)

The definitions of ‘working’ and ‘work-related’ have practical importance in a number of situations. They are particularly important when interpreting or comparing results from different studies. For example, when considering work-related injury, the application of different definitions, or the differing application of the same definitions, will result in the differential inclusion and exclusion of people injured in the same types of incidents. This has led to the development of several approaches designed to better understand and standardise the coding and reporting of disorders related to work, such as Eurostat,<sup>2</sup> the International Conferences of Labour Statisticians,<sup>3</sup> the International Classification for External Causes of Injury,<sup>4</sup> and the International Statistical Classification of Diseases and Related Health Problems, 10<sup>th</sup> revision (ICD-10).<sup>5</sup> If comparisons are to be as valid as possible, it is essential to understand how the definitions and their application differ. This paper reports on a comparison of the classification of work-relatedness by research groups in three countries – the United States, New Zealand and Australia – which was conducted as part of a broader study comparing the number, rate and circumstances of work-related fatalities of workers in the three countries.<sup>6</sup> For the broader comparison, the study team used the various explicit inclusion and exclusion criteria of the data collections in the three countries to produce a common definition of ‘work-relatedness’. Essentially, this meant using the inclusion criteria of the data collection with the narrowest definitions.

The aim of the comparison presented here was to identify similarities and differences in the understanding of what was meant by work-relatedness in the three involved countries, and to highlight circumstances in which the classification varied. This information could then be used to clarify the definitions of work-relatedness used in the overall comparison study, and more generally in other studies of work-related injury and disease.

## Methods

Groups from three countries – United States, New Zealand and Australia – were involved in the current study, which developed as part of larger study comparing the work-related fatalities of workers in the three countries. For the larger study, the New Zealand and Australian groups obtained their data on work-related fatalities primarily from coronial records as part of one-time studies of work-related fatalities in their countries.<sup>7,8</sup> The data for the United States came from their on-going surveillance of work-related fatalities using death certificate information.<sup>9</sup> The study presented here involved an assessment of the similarities and differences

between the three groups in identifying fatal incidents as work-related. The basic definitions for the three original studies are shown in Appendix 1.

Three-hundred-and-thirty-three brief scenarios describing various circumstances in which people died were prepared. Most, but not all, of these described incidents in which one or more persons was fatally injured. Although fictitious, the scenarios covered the type of circumstances commonly described in coronial files. They had initially been developed to assist in the training and monitoring of the classification reliability of research officers involved in the Australian study of work-related fatalities. They were designed to cover most conceivable circumstances in which someone might be fatally injured in relation to work (‘Work-related’), circumstances that were not related to work (‘Not work-related’), and other circumstances that were ambiguous or lacking detail as to their relationship to work (‘Indeterminate’). Within the work-related category, the following specific categories of circumstances and their intended definitions were included:

worker:	working for pay, profit or kind;
bystander:	non-worker injured as a result of the work of another person;
commuter:	worker travelling to or from the place of work;
volunteer:	performing unpaid duties under some sort of formal arrangement;
student:	undergoing instruction in connection with formal primary, secondary, tertiary or directly vocational education;
home duties:	performing unpaid domestic duties in one’s own home (or the home of someone else); and
other on-farm:	person injured on a farm but who did not meet the definition of being a worker or bystander (this group was identified so the information could be used as part of a related study of all fatal incidents on farms).

For each of these categories and the ‘Not work-related’ category, a number of scenarios were developed, some of which clearly met the study definitions and some of which were ambiguous for one or more reasons (sometimes just through lack of information) and which were designed to be coded as ‘Indeterminate’. Within each category, several scenarios were used to describe each of a number of specific subcategories (e.g., deaths on farms, bystander deaths in motor vehicle collisions, natural cause deaths). Examples of the scenarios included:

- *‘A man stops at a petrol station on his way home from work. As he goes to the shop to pay, he is struck by a car leaving the premises.’;*
- *‘A garbage truck runs over the pay manager at a waste disposal centre.’*

- ‘A man dies when he falls from a balcony during the office Christmas party.’; and
- ‘A woman drowns whilst surfing with friends at a popular public beach.’

All 333 scenarios, randomly sorted, were coded by one or two researchers from each country for this study. The categories used for the coding were:

1. Worker
2. Bystander
3. Commuter
4. Volunteer
5. Student
6. Suicide
7. Other category included in the country’s data set
9. Unknown
10. Not work-related (i.e., not in any of the above categories)

For each scenario, two main decisions were required and two codes recorded. The first decision required the coder to choose the most appropriate category (from those shown above) to which the scenario should be assigned. If a scenario equally satisfied more than one category, coders were instructed to choose the category with the lowest number. The second decision concerned the coder’s certainty that, on the basis of the information provided, the scenario belonged in that category (coded as ‘definite’ or ‘indeterminate’). ‘Unknown’ and ‘Indeterminate’ covered different aspects of the coding process. The ‘Unknown’ choice in the first decision was used when the coder could not decide which specific category was the most appropriate. The second decision indicated the perceived strength of the evidence on which the first decision was based, and the ‘Indeterminate’ choice indicated that the evidence was not strong or was ambiguous.

During the data collection and coding for each country’s study, there were usually multiple coders involved in assigning cases as work-related or not. This posed difficulties in deciding who the most appropriate representatives of each country were for inclusion in this comparison of coding. In New Zealand and Australia, the original study teams (of which the coders for this project were members) were small and worked closely together, so any of the members could be expected to apply the definitions in a similar manner to all the members of their respective study team. The situation was different for the United States, in which the coding came from death certificates for which the ‘at work’ information is completed by the decedents’ funeral directors. Thus, coding in the United States is usually completed by hundreds of different people in different places at different times. Since it was not possible to identify and include a representative group of these coders for this study, it was decided to use the researchers who maintain the surveillance program. These researchers were familiar with the definitions used in the United States and the instructions for coding ‘at work’ on the death certificate. The final choice of

participants was based on these factors and the availability of suitable personnel.

Two persons from New Zealand participated, each coding about half the scenarios. One person from Australia coded all scenarios. The scenarios were also independently coded by two other members of the Australian study team, each of whom coded about half the scenarios. Any discrepancies with the main coder were discussed and the main coder’s assigned code changed where appropriate. The coding from the United States was done independently by two researchers, who compared their coding and agreed on a final code if there was initial variation between them.

The results presented here focus on the classification of deaths as involving workers or not. They include the level of agreement obtained, expressed as the percentage of all scenarios which were classified the same by all three countries, and the associated overall, and category-specific, Kappa scores as a standardised measure of agreement.<sup>10</sup> For the main analysis of the *Worker* category, the categories were collapsed into three – *working* (those classified to category 1), *not working* (those classified to any other category except 9), and *unknown if working* (those classified to category 9), regardless of degree of certainty.

## Results

The overall assignment of cases to most groups was similar for the three countries. The main differences were that the United States had a lower proportion in the *Bystander* and *Volunteer* categories, and a higher proportion in the *Not work-related* category, compared with the other countries (Table 1).

The confidence with which the assignments were made was similar between the three countries, with each country identifying about 85% as being definitely in the assigned category.

The agreement in overall classification was similar between the pairs of countries (Australia-United States: 72%; Australia-New Zealand: 77%; New Zealand-United States: 70%). Overall, 208 (62%) of the scenarios were given exactly the same classification by all three countries, and only 18 (5%) were classified differently by all three countries. However, for some categories, there was considerable disagreement between the classification of scenarios (Table 2).

The main comparison of interest was for the classification of cases as working. Grouping all 333 cases into three categories (*working*, *not working*, and *unknown*), the classifications were compared between countries. The overall agreement was very good and similar between pairs of countries and among all three countries (Table 3).

For the 91 scenarios identified as *working* by at least one country, there was complete agreement for 68% and agreement in the *working* classification between at least two countries in 87%. Of the 258 scenarios identified as *not working* by at least one country, there was complete agreement for

Table 1. Overall classification of scenarios by country – number and percent (n = 333).

Category	Australia n (%)	New Zealand n (%)	United States n (%)
Worker	82 (25)	73 (22)	77 (23)
Bystander	52 (16)	57 (17)	36 (11)
Commuter	22 (7)	16 (5)	16 (5)
Volunteer	25 (8)	22 (7)	13 (4)
Student	21 (6)	17 (5)	18 (5)
Suicide	6 (2)	6 (2)	6 (2)
Unknown	29 (9)	29 (9)	24 (7)
Not work-related	96 (29)	113 (34)	143 (43)
<b>Total</b>	<b>333 (100)</b>	<b>333 (100)</b>	<b>333 (100)</b>
Confident classification <sup>1</sup>	280 (84)	283 (85)	284 (85)

<sup>1</sup> Scenarios identified as ‘definitely’ in the chosen category.

Table 2. Category-specific agreement between countries<sup>1</sup> – number and percent<sup>2</sup>.

Category	Complete agreement <sup>3</sup> n (%)	Two countries agreed <sup>4</sup> n (%)	One Country <sup>5</sup> n (%)	Total <sup>6</sup> n (%)
Worker	62 (68)	17 (19)	12 (13)	91 (100)
Bystander	23 (30)	22 (29)	32 (42)	77 (100)
Commuter	11 (38)	3 (10)	15 (52)	29 (100)
Volunteer	10 (39)	14 (54)	2 (8)	26 (100)
Student	12 (48)	7 (28)	6 (24)	25 (100)
Suicide	6 (100)	0 (–)	0 (–)	6 (100)
Unknown	5 (10)	9 (17)	38 (73)	52 (100)
Not work-related	53 (32)	50 (30)	62 (38)	165 (100)
Overall <sup>7</sup>	208 (63)	107 (32)	18 (5)	333 (100)

<sup>1</sup> For each comparison, the cases were classified as in the category, in another category, or unknown which category.

<sup>2</sup> Percent based on total cases coded in the category by at least one country.

<sup>3</sup> Cases that all three countries coded the same.

<sup>4</sup> Cases that two of the three countries coded in the category.

<sup>5</sup> Cases that two of the three countries coded in a different category.

<sup>6</sup> Total number of cases that were coded in the category by at least one country.

<sup>7</sup> Overall agreement for all categories.

Table 3. Overall agreement between countries classifying cases as working, not working and unknown – percent and Kappa values (n = 333).

Comparison	Agreement (percent)	Kappa
Australia – United States	90	0.77
Australia – New Zealand	86	0.70
United States – New Zealand	83	0.63
Overall	80	0.71

78%. However, the agreement for the 52 cases identified as *unknown* by at least one country was much lower, with complete agreement in only 10%. The difference in agreement between the three categories was reflected in the Kappa values, with high Kappas for *working* and *not working* and a lower Kappa for *unknown* (Table 4).

The scenarios were examined to see which of the described circumstances appeared more difficult to classify clearly as work-related deaths of workers or not. For most types of circumstances, there was little variation in classification of scenarios. This was true for incidents that occurred in fixed workplaces, domestic settings, on the road or in other public places; and whether they involved children or adults.

Table 4. Category-specific agreement between countries classifying cases as working, not working or unknown – number, percent<sup>1</sup> and Kappa values.

Category	Complete agreement <sup>2</sup> n (%)	One different <sup>3</sup> n (%)	Two different <sup>4</sup> n (%)	Total <sup>5</sup> n (%)	Kappa
Working by at least one country	62 (68)	17 (19)	12 (13)	91 (100)	0.84
Not working by at least one country	200 (78)	38 (15)	20 (8)	258 (100)	0.73
Unknown by at least one country	5 (10)	9 (17)	38 (73)	52 (100)	0.46
Overall <sup>6</sup>	267 (80)	64 (19)	2 (1)	333 (100)	0.71

<sup>1</sup>Percent based on total cases coded in the category by at least one country.

<sup>2</sup>Cases that all three countries coded the same.

<sup>3</sup>Cases that two of the three countries coded in the category.

<sup>4</sup>Cases that two of the three countries coded in a different category.

<sup>5</sup>Total number of cases that were coded in the category by at least one country.

<sup>6</sup>Overall agreement classifying the cases as working, not working or unknown if working.

However, there were some common themes in the scenarios where the coding of work-related deaths of workers varied. The main themes were:

- Instances of domestic violence that occurred in the workplace of the fatally injured person were considered to be work-related by the United States and New Zealand, but were coded as not being work-related by Australia. Examples of relevant scenarios were:
  - ‘A public servant engaged in a torrid affair at work is shot in her office by her jealous husband.’; and
  - ‘A man is brutally murdered by his wife because, she says, he spends too much time at his computer working on his “damned Work-Related Fatalities Study”.’.
- Persons fatally injured on business trips were coded as *working* by Australia regardless of the activity at the time of injury, but either as *working*, *commuting* or *not work-related* by the United States and New Zealand, depending on the specific circumstances described. An example of the relevant scenarios was:
  - ‘A business executive is murdered walking back from a restaurant to her hotel during an interstate business trip.’.
- Social functions on work-premises, or held elsewhere but sponsored by the employer, were coded as *working* by Australia, whereas the United States and New Zealand tended to code them as *working* if they occurred at the workplace, and *not work-related* if they occurred elsewhere. An example of the relevant scenarios was:
  - ‘A tiler at the end-of-week site drinks dies when he is struck by falling scaffolding.’.
- There was variation between the three countries regarding which circumstances in farm incidents were classified as working. These included the involvement of hobby farmers and of casual fruit pickers, who were more often considered to have been working by Australia, and persons hunting on farms (with no other information), who were more often considered to have been working by New

Zealand, to have been coded as *unknown* by Australia and to have been coded as *not work-related* by the United States. Examples of relevant scenarios were:

- ‘A doctor dies in a tractor rollover incident whilst working on his hobby farm.’;
  - ‘A backpacker from Sweden dies whilst picking fruit for casual wages when he falls from a ladder and strikes his head on a tree stump.’; and
  - ‘A man hunting rabbits on a farm trips whilst jumping over a log and accidentally shoots himself. He dies three weeks later as a result of the wound.’.
- Persons involved in motor vehicle collisions tended to be coded as *not work-related* by the United States and New Zealand unless there was definitive evidence to suggest that the person was working, whereas Australia tended to code these scenarios as *unknown* unless there was specific evidence that the person was, or was not, working at the time. For example,
    - ‘The single occupant in a motor vehicle is killed when the car runs off the road and strikes a tree. No other information is known.’

There was also considerable variation in the classification of scenarios as bystander deaths and commuting deaths, and in terms of distinguishing between volunteer work and paid work. Volunteer fire fighters were classified as *working* by the United States, but were included with the other volunteer workers by New Zealand and Australia. This probably reflects the usual United States case definition for workers, which includes volunteer firefighters and volunteer law enforcement officers as workers.

## Discussion

The comparison presented here was primarily designed to better understand differences in what is meant by ‘working’ and ‘work-related’ in terms of the recording of fatal injury in three developed countries, as part of a larger comparison

study of work-related deaths which occurred in the countries. No common definitions were used prior to the data collection in the respective countries, so the results reflect the way the coders in each country applied their own definitions, rather than the ability of coders in each country to apply the same definitions. Differences in classification between these national data sets can therefore be due to variations between countries in both the definitions used and their application. The coders from Australia and New Zealand who took part in the comparison were members of small study teams and were likely to be representative of all the coders involved in the two countries' studies. The situation is less clear for the United States, where hundreds of people were potentially involved in coding, and there was no way to easily identify a representative sample of them. Nevertheless, the researchers who were included were very familiar with the coding rules and, in broad terms, with the way they are applied in the field.

Considering this, there was a high level of agreement in this study between the coding of working status (whether the person was working or not), with complete agreement between the three countries for 80% of all the scenarios. Also, of the scenarios classified as work-related deaths of workers by at least one country, 87% had at least one other country making the same classification. There was also reasonable agreement as to whether the scenarios involved students, volunteers or suicides, but only moderate agreement for classifying bystanders and commuters. The overall study, from which this study arose, included only 'workers,' and used common general inclusion and exclusion criteria for the data sets from the three countries involved, in an attempt to make the information from them as comparable as possible. Such comparisons are still heavily reliant on each country's application of its own definition of working. The results presented here suggest that the definitions, and their application, are similar in the involved countries.

A number of characteristics of potentially work-related incidents that can cause classification difficulties were also identified. Domestic violence incidents at work, volunteer workers, business trips, social functions connected with work, hobby farmers and some possible bystander incidents that occurred on farms or on the roads were areas where coding was most variable between the three countries. Each of these areas has an overlap between an individual's roles and responsibilities as a worker and as a private citizen. Each also contains uncertainty regarding where the responsibilities of the employer stop. The disparity between countries in coding some of the categories stems from differences in coding practices and in different interpretations of the extent of responsibility of the employer. For example, in the United States' definition, bystanders, commuters, and farm non-work are all considered 'not work related' and are not separately distinguished. Thus, coders are unaccustomed to recognizing or coding such cases into independent classes. When the coding was collapsed to 'working' (the common case definition used in the collaborative comparison) versus all other categories, the agreement between countries was acceptable.

There was also variation in the level of certainty of information required by the coders to make a definitive choice for individual scenarios, although the overall proportion of scenarios being 'Definitely' assigned to a category was similar in each country. The scenarios presented were brief and did not contain information on every possible contingency, reflecting the kind of information typically recorded on death certificates and other public health data. Short narratives are increasingly advocated as an important component of recording information on injurious incidents (whether work-related or not) that are recorded in settings such as emergency departments. Therefore, it is important to establish the level of detail required by a coder before a definitive classification is made.

The high level of agreement obtained in this study for most scenarios describing fatal injuries to persons whilst working, even without the use of standard definitions, suggests that comparisons between the data sets of the countries involved in this study can be made with confidence. However, it should be noted that this study only examined the approach taken by the three countries to classifying brief scenarios. The New Zealand and Australia data from their overall studies were obtained from coronial records, so classification was based on information of widely varying detail and quality, but nearly always of more depth than provided by the scenarios used for this study. The United States' data, which generally were much less detailed, were obtained from death certificates. The sensitivity and specificity of classification of work-relatedness using these differing data sources is not known. Therefore, this study provides a good understanding of how the three countries classify potentially work-related circumstances based on the same information, but only an indirect understanding of how the classification is made in real life.

The two key findings of the study – variation in the understanding of what is and what is not work-related, and variation in the amount or type of information required to make a definitive classification – highlight the need for definitions that are as clear and unambiguous as possible. The results also show that, even with the same general inclusion and exclusion criteria, some differences in coding of similar circumstances can be expected. This emphasises the importance of minimising ambiguity in the definitions used, and of attempting to understand the manner in which the definitions are applied, when comparing data from different sources. Standardised coding schemes, such as ICD-10 and ICECI, and attempts to better understand, and to minimize, the differences between coding approaches, such as those undertaken by Eurostat and the International Conferences of Labour Statisticians, are important in this regard. Also, it is important not to assume that all persons will code in the same manner even if they do use the same coding scheme. In some situations, it may be necessary to use the lowest common denominator, and thus to exclude certain groups of cases, in order to produce data sets with acceptably similar inclusion criteria.

## Acknowledgements

The authors would like to thank Leigh Hendrie, Simon Horsburgh, Maureen Howard, John Mandryk, Suzanne Marsh, and Rebecca Mitchell for their contributions to the project and for comments on the manuscript.

## Disclaimer

The opinions expressed in this publication are those of the authors and not necessarily those of their employers.

## References

- 1 Driscoll T. Are work-related injuries more common than disease in the workplace? *Occup Med.* 1993;43:164–166.
- 2 Jougl E, Pavillon G, Rossollin F, De Smedt M, Bonte J. Improvement of the quality and comparability of causes-of-death statistics inside the European Community. EUROSTAT Task Force on ‘causes of death statistics’. *Rev Epidemiol Sante Publ.* 1998;46(6):447–456.
- 3 International Labour Organization (ILO). Statistics of occupational injuries. *Sixteenth International Conference of Labour Statisticians ICLS/16/1998/III. Report III.* <http://www.ilo.org/public/english/bureau/stat/techmeet/16th/icls/report3.htm>.
- 4 World Health Organization (WHO). Collaborating Center on Injury Surveillance. *Data Dictionary: International Classification of External Causes of Injuries.* Amsterdam: Consumer Safety Institute, 2001.
- 5 World Health Organization (WHO). *International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10).* Geneva: WHO, 1992.
- 6 Feyer AM, Williamson A, Stout N, Driscoll T, Usher H, Langley J. Comparison of work-related fatal injuries in the United States, Australia and New Zealand: method and overall findings. *Injury Prev.* 2001;7(1):22–28.
- 7 Feyer AM, Langley J, Howard M, Horsburgh S, Wright C, Alsop J, Cryer C. The work-related fatal injury study: numbers, rates and trends of work-related fatal injuries in New Zealand 1985–1994. *New Zealand Med J.* 2001;114(1124):6–10.
- 8 Driscoll T, Mitchell R, Mandryk J, Hull B, Hendrie L, Healey S. Work-related fatalities in Australia, 1989 to 1992: an overview. *J Occup Health Safety.* 2001;17(1):45–66.
- 9 National Institute of Occupational Safety and Health (NIOSH). *Fatal injuries to workers in the United States, 1980–1989: a decade of surveillance.* Cincinnati: CDC, 1993.
- 10 Fleiss J. *Statistical methods for rates and proportions.* 2<sup>nd</sup> Ed. Brisbane: John Wiley and Sons, 1981.
- 11 Feyer A, Langley J, Howard M, Horsburgh S, Wright C, Alsop J, Cryer C. *Work-related fatal injuries in New Zealand 1985–1994: Descriptive epidemiology.* Dunedin: University of Otago, 1999.

## Appendix 1 Work-related definitions

### Australia

(Taken from Driscoll et al.<sup>8</sup>)

The main definition for inclusion of a death in this study was:

*A person who suffered a non-suicide traumatic death, that occurred in Australia or to Australian-based workers, to which workplace exposures contributed as a necessary factor and which can be attributed, as an individual death, to those exposures.*

The study excluded all persons who:

- died as a primary result of diseases, such as cancers and heart attacks;
- committed suicide, even if there appeared to be some direct connection with work; and
- did not die as a result of their injuries.

**Workers** were defined as persons who were injured while performing some kind of activity for pay, profit or kind (including commuting to or from work). The ‘working’ group (which excluded commuters) was divided into two subgroups – **workplace** and **work-road**. The work-road group comprised workers who were killed in motor vehicle incidents on public roads in the course of their work (note that this group did NOT include commuters). The workplace group comprised all other workers who were fatally injured as a result of work activity. These people were usually injured in some form of fixed workplace.

**Commuters** were persons killed whilst traveling to or from work.

**Bystanders** were persons who were not working but who were killed directly as a result of someone else’s work activity. **Workplace bystanders** were any persons not working and fatally injured as a result of workplace activities usually not associated with public roads or public transport. **Road bystanders** were persons not working and fatally injured in a motor vehicle incident on a public road (or on public transport) as a result of other people’s work, where the working vehicle was primarily ‘at fault’ in the incident. Examples included pedestrians or persons in vehicles hit by a semi-trailer whose driver had lost control of the vehicle, or pedestrians or persons in vehicles struck by an emergency vehicle involved in a high-speed chase.

The study also included a number of other groups whose death was related to work in a more indirect way. These groups were volunteers, students, persons performing home duties and persons fatally injured on farms but not due to obvious farm work.

### New Zealand

(Taken from Feyer et al.<sup>11</sup>)

The definition of work-relatedness in the work-related fatal injuries study encompassed all deaths which occurred:

- unintentionally, or due to homicide;
- when people were working for pay, profit or payment-in-kind, including, for example, unpaid family assisting with a family business;
- when people were assisting with work activity in an unpaid capacity as official volunteers or students;
- away from the workplace or in a non-work period, but to which work contributed;
- due to incidents which were in New Zealand waters;
- due to injuries on public roads that did not involve traffic;
- due to traffic accidents on private roads, e.g., accidents involving vehicles on private access roads to farms or quarries.

Deaths to which work exposures may have contributed but which were specifically excluded were those which occurred:

- due to traffic crashes on public roads;
- one year or longer after the injury;
- due to suicide;
- due to occupational diseases, and non-discrete events;
- due to injuries to the military or involving the military that did not occur in New Zealand territory;
- due to unpaid home duties;
- through medical misadventure or complications;

- for individuals less than 15 years of age, or greater than 84 years of age;
- due to the commission of a crime by the victim.

### United States

(Taken from NIOSH.<sup>9</sup>)

#### *Operational Guidelines for determination of injury at work*

1. Complete the injury at work item if any other than natural cause of death is mentioned in Part I or Part II of the medical certification, including homicides, suicides, and accidents, including motor vehicle deaths.
2. The injury at work item *must* be completed for decedents aged 14 or over and may be completed for those less than 14 years of age if warranted. Consider possibility of work injury regardless of whether injury occurred in the course of work in ‘usual’ or other occupation and/or industry. If decedent’s ‘usual’ occupation is housewife, student or retired consider possible injury during other employment. If occupation is transportation-related, suspect injury at work and evaluate per criteria.
3. Consider available information with regard to location and activity at time of injury. If location is farm, suspect work-related and evaluate per criteria.

---

#### Criteria for the United States

#### Injury at work

##### **On Employer Premises**

Engaged in work activity, apprentice, vocational training	Yes
On break, in hallways, rest room, cafeteria, storage area	Yes
In employer parking lots while working, arriving or leaving	Yes
Engaged in recreational activities on employer-controlled facilities (games, etc.) for personal enjoyment	No
As a visitor for non-work purposes, not on official business	No

##### **Off Employer Premises**

Working for pay or compensation, including at home	Yes
Working as a volunteer EMS, firefighter, or law enforcement officer	Yes
Working in a family business, including family farm. Activity should be clearly related to a profit-oriented business	Yes
Traveling on business, including to and from customer/business contacts	Yes
Engaged in work activity where vehicle is considered the work environment (e.g., taxi driver, truck driver, etc.)	Yes
Homemaker working at homemaking activities	No
Working for self – non-profit, i.e., mowing lawn, repairing own roof, hobby, or recreation activities	No
Student engaged in school activities	No
Operating vehicle (personal or commercial) for non-work activities	No
Commuting to or from work site	No

---